

REMARKS

Applicant acknowledges receipt of the Office Action mailed March 10, 2009.

In the Office Action, the Examiner rejected claims 1, 8, 9, 15, 16, 18, 19, 23, 24, 27, and 28 under 35 U.S.C. § 103(a) as being unpatentable over *Uno et al.* (U.S. Patent No. 5,008,002) in view of *Roffman et al.* (U.S. Patent No. 5,861,114) and *Oomen* (U.S. Patent No. 5,078,551); rejected claim 5 under 35 U.S.C. § 103(a) as being unpatentable over *Uno* in view of *Roffman* and *Oomen*, and further in view of *Umetani et al.* (U.S. Patent No. 5,171,348); and rejected claim 6 under 35 U.S.C. § 103(a) as being unpatentable over *Uno* in view of *Roffman* and *Oomen*, and further in view of *Border et al.* (U.S. Patent Pub. No. 2003/0127759);

By this Amendment, Applicant amends claims 1 and 9. Upon entry of this Amendment, claims 1, 2, 5, 6, 8, 9, 11-16, 18-24, and 27-31 will remain pending, with claims 2, 11-14, 20-22, and 29-31 withdrawn from examination. Of the claims under examination, claim 1 is independent.

The originally-filed specification, claims, abstract, and drawings fully support the amendments to claims 1 and 9. No new matter has been introduced.

Applicant traverses the rejections above and respectfully requests reconsideration for at least the reasons set forth below.

I. 35 U.S.C. § 103(a) REJECTIONS

Applicant traverses the Examiner's rejection of claims 1, 8, 9, 15, 16, 18, 19, 23, 24, 27, and 28 under 35 U.S.C. § 103(a) as being unpatentable over *Uno* in view of *Roffman* and *Oomen*. Applicant respectfully submits that independent claim 1 is

patentably distinguishable over *Uno*, *Roffman*, and *Oomen* at least for the reasons described below.

In order to establish a *prima facie* case of obviousness under 35 U.S.C. §103(a), the prior art references (separately or in combination) must teach or suggest all the claim limitations. See M.P.E.P. § 2142, 8th Ed., Rev. 5 (August 2006). “[I]n formulating a rejection under 35 U.S.C. § 103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed.” *USPTO Memorandum* from Margaret A. Focarino, Deputy Commissioner for Patent Operations, May 3, 2007, p. 2. “[T]he analysis supporting a rejection ... should be made explicit” and it is “important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements in the manner claimed.” *Id.* (citing *KSR Int’l Co. v. Teleflex, Inc.*, No. 04-1350 (U.S. Apr. 30, 2007)).

Uno appears to disclose a process for producing a mold using an ion plating method, including forming an i-carbon film on a mold base for obtaining a press-molded glass article. (*Uno*, Abstract).

As admitted by the Examiner, “*Uno et al.* do not teach how deep the cut is into the SiC film or that the cut is made with a single point cutting tool that is fixed at the single point.” (*Office Action*, p. 3, ll. 10-11). *Uno* also fails to teach or suggest a method of forming a die surface onto a producing die to produce an optical element, the method comprising the steps of: “moving the material relatively to the cutting tool so as to form the die surface having a diameter of 5 mm or less with a curvature on the material; . . . wherein the cutting tool has a cutting edge capable of coming in contact with the

material, the cutting edge comprises a diamond and the cutting step is conducted while the cutting tool is set such that a single point of the cutting edge comes in contact with the material as a cutting point, the cutting point of the cutting edge is fixed at the single point, and a (110) surface of the diamond is used as a rake face at the cutting point,” as recited in claim 1.

Accordingly, in order to cure the deficiencies of *Uno*, the Examiner relies on *Roffman* and *Oomen* and asserts that “*Roffman* et al. teach a method of cutting dies/molds for forming complex optical surfaces wherein a single point diamond lathe having submicron precision and repeatability is employed . . .” (*Office Action*, p. 3, ll. 12-14); and “*Oomen* . . . disclose[s] a diamond lathe wherein the cutting point is fixed while the workpiece moves” (*Id.* at p. 3, ll. 15-17).

Roffman appears to disclose a method of manufacturing complex optical designs in soft contact lenses using diamond point turning to machine contact lens blanks without the need for polishing the lens. The diamond lathes provide an accuracy of 20 nm and a resolution of 10 nm with an absolute shape accuracy that is better than 1 micron. (*Roffman*, col. 24, ll. 55-60). Moreover, *Roffman* appears to disclose using stainless steel as an insert of a die. (*Id.* at col. 8, ll. 35-37).

Roffman, however, fails to teach or suggest a method of forming a die surface onto a producing die to produce an optical element, the method comprising the steps of: “moving the material relatively to the cutting tool so as to form the die surface having a diameter of 5 mm or less with a curvature on the material; . . . wherein the cutting tool has a cutting edge capable of coming in contact with the material, the cutting edge comprises a diamond and the cutting step is conducted while the cutting tool is set such

that a single point of the cutting edge comes in contact with the material as a cutting point, the cutting point of the cutting edge is fixed at the single point, and a (110) surface of the diamond is used as a rake face at the cutting point,” as recited in claim 1.

Oomen appears to disclose a diamond tool 1 comprising a tool tip 5 of boron-containing single-crystal diamond. (*Oomen*, Abstract). *Oomen* appears to further disclose a cutting process for cutting a flat plate having a Vickers hardness of 86 Hv or less with a diamond cutting edge. The cutting technique uses a (001) crystal face of the diamond as a rake face with a cutting-in depth of 1 μm or less.

Oomen, however, fails to teach or suggest a method of forming a die surface onto a producing die to produce an optical element, the method comprising the steps of: “moving the material relatively to the cutting tool so as to form the die surface having a diameter of 5 mm or less with a curvature on the material; . . . wherein the cutting tool has a cutting edge capable of coming in contact with the material, the cutting edge comprises a diamond and the cutting step is conducted while the cutting tool is set such that a single point of the cutting edge comes in contact with the material as a cutting point, the cutting point of the cutting edge is fixed at the single point, and a (110) surface of the diamond is used as a rake face at the cutting point,” as recited in claim 1.

As evidenced in the attached Declaration, the following tests were conducted:

(1) in Examples 1 and 2, the cutting process was conducted to form a die surface onto a ceramic layer with a hardness of 2400 HV in such a way that a (110) crystal face of the diamond was used as a rake face and a cutting-in depth was set to 100 nm;

(2) in Comparative Examples 1 and 2, the cutting process was conducted in the same way as in Example 1 above, except that a (100) crystal face of the diamond equivalent to the (001) crystal face taught by *Oomen* was used as a rake face;

(3) in Comparative Example 3, the cutting process was conducted in the same way as in Example 1 above, except that a (111) crystal face of the diamond was used as a rake face, and another (111) crystal face of the diamond located on an extension line in a direction crossing the rake face was used as a flank face; and

(4) in Comparative Example 4, the cutting process was conducted in the same way as in Example 1 above, except that a cutting-in depth was set to 5 μm instead of 100 nm.

As stated in the Declaration, a cutting performance was evaluated in terms of shape error and surface roughness. The following results were obtained:

(A) in Examples 1 and 2, a die surface for transferring an optical surface was efficiently formed with a high accuracy on the ceramic layer above;

(B) in contrast, in Comparative Examples 1 and 2, the cutting edge wore out greatly, and the worn-out shape of the cutting edge adversely affected the shape error and the surface roughness;

(C) further, in Comparative Example 3, the cutting edge was chipped, adversely affecting the shape error and the surface roughness; and

(D) moreover, in Comparative Example 4, the cutting edge was broken, and a die surface capable of transferring a proper optical surface was not formed.

Consequently, since none of the above references teaches a cutting technique which uses a (110) crystal face of the diamond as a rake face with a cutting-in depth of

1 μ m or less in order to form a small curved die surface on a super hard material above, the above effect of the cutting technique of the present invention would have been unexpected from the alleged prior art references cited above.

Accordingly, with respect to independent claim 1, *Uno*, *Roffman*, and *Oomen* fail to teach Applicant's claimed combination, including, *inter alia*:

[a] method of forming a die surface onto a producing die to produce an optical element, the method comprising the steps of: moving the material relatively to the cutting tool so as to form the die surface having a diameter of 5 mm or less with a curvature on the material; . . .

wherein the cutting tool has a cutting edge capable of coming in contact with the material, the cutting edge comprises a diamond and the cutting step is conducted while the cutting tool is set such that a single point of the cutting edge comes in contact with the material as a cutting point, the cutting point of the cutting edge is fixed at the single point, and a (110) surface of the diamond is used as a rake face at the cutting point.

For at least the foregoing reasons, a *prima facie* case of obviousness has not been established with respect to independent claim 1. Accordingly, independent claim 1, and claims 8, 9, 15, 16, 18, 19, 23, 24, 27, and 28 which depend from claim 1, are patentable over *Uno*, *Roffman*, and *Oomen*. Applicant therefore requests that the rejection of claims 1, 8, 9, 15, 16, 18, 19, 23, 24, 27, and 28 under 35 U.S.C. § 103(a) be withdrawn.

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Uno* in view of *Roffman* and *Oomen*, and further in view of *Umetani*; and claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Uno* in view of *Roffman*

and *Oomen*, and further in view of *Border*. The deficiencies of *Uno*, *Roffman*, and *Oomen* are discussed above.

The Examiner relies on *Umetani* for allegedly disclosing that “aspherical surfaces may . . . be made” (*Office Action*, p. 5, line 2); and *Border* for allegedly disclosing that “it is known in the art to make microlens molds having diameters down to the micron sized range (paragraph [0005, 0049])” (*Id.* at p. 5, ll. 13-15). Such teachings, even if present in *Umetani* and *Border*, however, fail to teach or suggest, *inter alia*,

[a] method of forming a die surface onto a producing die to produce an optical element, the method comprising the steps of: moving the material relatively to the cutting tool so as to form the die surface having a diameter of 5 mm or less with a curvature on the material; . . .

wherein the cutting tool has a cutting edge capable of coming in contact with the material, the cutting edge comprises a diamond and the cutting step is conducted while the cutting tool is set such that a single point of the cutting edge comes in contact with the material as a cutting point, the cutting point of the cutting edge is fixed at the single point, and a (110) surface of the diamond is used as a rake face at the cutting point,

as required by claim 1 (emphases added).

Therefore, *Uno*, *Roffman*, *Oomen*, *Umetani*, and *Border* fail to teach or suggest all of the limitations of claim 1, and claims 5 and 6 are therefore patentable over *Uno*, *Roffman*, *Oomen*, *Umetani*, and *Border* at least due to their dependence from independent claim 1. Applicant therefore requests that the rejection of claims 5 and 6 under 35 U.S.C. § 103(a) be withdrawn.

II. CONCLUSION

Applicant respectfully submits that claims 1, 2, 5, 6, 8, 9, 11-16, 18-24, and 27-31 are in condition for allowance. Applicant therefore requests reconsideration of the application, and the timely allowance of the pending claims.

The Office Action contains characterizations of the claims and the related art with which Applicant does not necessarily agree. Unless expressly noted otherwise, Applicant declines to subscribe to any statement or characterization in the Final Office Action.

Please grant any extensions of time required to enter this response and charge any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

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GARRETT & DUNNER, L.L.P.

Dated: July 10, 2009

By: /David W. Hill/
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Attachment: One (1) Declaration under 37 C.F.R. § 1.132 (13 pages)